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"BIAS UJIAN ANEKA PILIHAN MATEMATIK KBSM BERDASARKAN PERBEZAAN INDIVIDU DAN ORIENTASI PEMBELAJARAN MATEMATIK"

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Penilai Dalaman *(Internal Assessor)*	: **Prof. Madya Dr. Najib Ahmad Marzuki**	Tandatangan *(Signature)*
Penyelia *(Supervisor)*	: **Prof. Dr. Rosna Awang Hashim**	Tandatangan *(Signature)*

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BIAS UJIAN ANEKA PILIHAN MATEMATIK KBSM BERDASARKAN PERBEZAAN INDIVIDU DAN ORIENTASI PEMBELAJARAN MATEMATIK

Oleh

ARSAYTHAMBY VELOO

TESIS INI DISERAHKAN KEPADA DEKAN PUSAT PENGAJIAN SISWAZAH UNTUK MEMENUHI KEPERLUAN IJAZAH DOKTOR FALSAFAH
UNIVERSITI UTARA MALAYSIA

KEBENARAN MENGGUNA

Tesis ini adalah sebagai memenuhi keperluan untuk mendapatkan Ijazah Doktor Falsafah daripada Universiti Utara Malaysia. Saya bersetuju membenarkan Perpustakaan Universiti Utara Malaysia untuk membuat salinan tesis ini bagi tujuan rujukan. Saya juga bersetuju membenarkan salinan tesis ini dibuat sebahagian atau keseluruhan, bagi tujuan akademik melalui kebenaran daripada penyelia saya atau semasa ketiadaan beliau, oleh Dekan Pusat Pengajian Siswazah . Sebarang penyalinan, penerbitan atau penggunaan ke atas keseluruhan atau sebahagian daripada tesis ini untuk perolehan kewangan tidak dibenarkan tanpa kebenaran bertulis daripada saya. Pengiktirafan yang sewajarnya haruslah diberikan kepada saya dan Universiti Utara Malaysia. Bagi sebarang penggunaan bahan daripada tesis ini untuk tujuan penulisan, permohonan untuk mendapat kebenaran membuat salinan atau lain-lain kegunaan secara keseluruhan atau sebahagian haruslah dibuat dengan menulis kepada,

Dekan Pusat Pengajian Siswazah
Universiti Utara Malaysia
06010 Sintok
Kedah Darul Aman

ABSTRAK

Kajian ini bertujuan untuk mengesan kualiti dan bias ujian aneka pilihan matematik. Kewujudan bias ujian aneka pilihan matematik dikenal pasti melalui perbezaan individu dari segi jantina, bangsa dan lokasi sekolah. Dari aspek bukan kognitif pemboleh ubah orientasi pembelajaran matematik (OPM) digunakan sebagai peramal pencapaian matematik. Teori Ujian Klasik (CTT) digunakan sebagai kerangka utama kajian dalam mengenal pasti ralat random dan ralat sistematik sebagai bias ujian. Responden kajian terdiri daripada 674 pelajar tingkatan empat yang dipilih secara persampelan rawak berstrata berperingkat di negeri Kedah. Kajian ini menggunakan ujian aneka pilihan matematik dan soal selidik OPM sebagai alat ukur. Ujian aneka pilihan matematik mengandungi 40 item manakala soal selidik OPM yang terdiri daripada sikap, kebimbangan, tabiat, tingkah laku penyelesaian masalah dan persekitaran pembelajaran matematik mengandungi 72 item (Maree, 1997). Program ITEMAN digunakan untuk menganalisis ujian aneka pilihan untuk mendapatkan pekali kesukaran dan pekali diskriminasi. Bagi ujian kesignifikan, penyelidik menggunakan ujian-t, ANOVA, korelasi dan regresi berganda.

Dapatan Kajian menunjukkan bahawa empat item (Garis Lurus, Set dan Garis dan Satah Tiga Matra) tidak memenuhi syarat pekali kesukaran manakala item Bulatan tidak memenuhi pekali diskriminasi. Hasil kajian ini mendapati Bidang Bentuk, Perkaitan dan Matematik KBSM bias kepada bangsa iaitu memihak kepada pelajar Cina dan bias kepada pelajar Melayu dan India. Bidang Bentuk dan Matematik pula bias kepada lokasi sekolah iaitu berkecenderungan kepada pelajar sekolah bandar dan bias kepada pelajar luar bandar. Faktor-faktor afektif seperti sikap, tabiat, tingkah laku penyelesaian masalah dan persekitaran pembelajaran matematik pula menunjukkan hubungan yang positif manakala kebimbangan matematik menunjukkan hubungan yang negatif dengan ujian aneka pilihan dan bidang matematik. Dapatan kajian ini menunjukkan bangsa dan lokasi sekolah berperanan sebagai pemboleh ubah penyederhana antara OPM dengan ujian aneka pilihan matematik. Dapatan kajian ini menyokong kewujudan bias ujian aneka pilihan dari segi ralat sistematik dalam Teori Ujian Klasik. Kajian ini menunjukkan pelajar Melayu dan India lemah dalam Bidang Bentuk, Perkaitan dan OPM. Pada keseluruhannya pelajar Melayu dan India menghadapi masalah dalam penyelesaian masalah matematik. Mereka perlu diberi perhatian yang khusus semasa pengajaran matematik terutamanya dalam penyelesaian masalah yang kompleks. Tambahan lagi peranan bangsa dan lokasi sekolah sebagai pemboleh ubah penyederhana menyumbang kepada pencapaian matematik yang rendah. Dalam mengenal pasti bias ujian, bidang matematik KBSM adalah penting bagi mendapatkan maklumat tentang penguasaan pelajar mengikut bidang kemahiran matematik. Kajian ini juga turut memberi implikasi kepada aspek afektif dan kognitif pelajar dalam pembelajaran matematik. Bias kebolehan afektif pelajar dalam pembelajaran matematik turut mengakibatkan bias dalam aspek kognitif. Oleh itu, sebelum proses pengajaran dan pembelajaran dijalankan faktor afektif pelajar perlu diberi penekanan terutamanya di kalangan pelajar yang lemah dalam matematik.

ABSTRACT

The purposes of this study are to identify bias in, and the quality of multiple choice mathematics questions. The existence of bias in multiple choice mathematics (MCM) test is identified from the perspectives of gender, ethnicity and school locality. The non-cognitive variable of Study Orientation of Mathematics (SOM) was utilized as a predictor of mathematics achievement. The Classical Test Theory (CTT) was used as the main framework to identify random and systematic error in testing biasness. Respondents consisted of 674 Form Four students in Kedah who were selected based on multistage stratified random sampling. The instruments administrated in this study included an MCM test and SOM. The MCM test consisted of 40 test items while the SOM questionnaire had 72 items, which investigated study attitude in mathematics, mathematics anxiety, study habits in mathematics, problem-solving behavior in mathematics and study environment in mathematics (Maree, 1997). The analysis of the MCM test was done using the ITEMAN program to obtain difficulty index and discrimination index. The researcher further used t-test, ANOVA, correlation and multiple regressions to test the research hypotheses.

The finding of this study shows that four items (Linear Equations, Set and Line and Plane in Three Dimensions) fail to fulfill the criteria of difficulty index while items on the topic Circle do not satisfy the discrimination index. Additionally the result of this study demonstrates that the field of Space, Relationship and KBSM Mathematics are biased towards Malay and Indian students but favour Chinese students. With regard to school locality, the field of Space and Mathematics shows biasness towards rural school students and favours urban school students. Furthermore, attitude, habit, problem-solving behavior, study environment and mathematics achievement show positive relationship, unlike mathematics anxiety which shows negative relationship with MCM test and fields of mathematics. Findings also show that ethnicity and school locality act as moderator variables between SOM and MCM test. This finding also supports the existence of biasness in MCM test in systematic error as in CTT. This study shows that Malay and Indian students are weak in the field of Space, Relationship and SOM. Overall, Malay and Indian students face problems in mathematics problem solving and they should be given particular attention by the teacher during mathematics lesson, particularly in solving complex problems. In addition, ethnicity and school locality are considered to be moderator variables contributing to low mathematical achievement. Nevertheless, in identifying biasness in test, one of the important aspects in Mathematics KBSM is to obtain information on students' ability in mathematics. The implication of this study can be seen in the affective and cognitive domains in mathematics learning. The affective ability bias in learning mathematics also involves biasness in cognitive aspect. Therefore, before the processes of learning and teaching is implemented, mathematics teachers should take cognizance of the importance of understanding student's affective variables, particularly those who are weak in mathematics.

PENGHARGAAN

Saya mengambil kesempatan ini untuk merakamkan penghargaan yang tidak terhingga kepada Prof. Dr. Rosna Awang Hashim selaku penyelia dan Profesor di Fakulti Sains Kognitif dan Pendidikan, Universiti Utara Malaysia. Beliau menjadi tulang belakang yang paling penting dalam menyiapkan disertasi seperti dikehendaki. Disepanjang disertasi ini dibuat beliau telah banyak memberi motivasi, dorongan, bantuan, komitmen, bimbingan dan nasihat yang tidak ternilai. Beliau juga tidak pernah rasa putus asa dalam meluangkan masa untuk membaca, menilai serta memberi komen yang membangun sehingga membangunnya disertasi ini.

Penghargaan khas juga ditujukan kepada Prof. Dato Dr. Wan Rafaei Abdul Rahman, Prof. Madya Dr. Lim Kong Teong, Prof. Madya Dr. Hassan Ali, Dr. Harshita Aini Haroon, Dr. Abdull Sukor Shaari, En. Selvam (FPP), En Surendren, En. Kalai, En. Mohamad Azmi, Dr. Wan Mohd Rani Abdullah dan Prof. Madya Dr. Yoong Suan.

Pengargaan yang tidak terhingga juga dihulurkan anak-anak tersayang Kumarendren, Dhurgaashini dan Indderkumar serta kepada ibu bapa saya M. Veloo dan S. Letchumi serta keluarga abang iaitu Gunaseelan, Rajamani serta anak-anaknya dan adik beradik atas sokongan yang diberi.

Kepada yang tidak disebutkan nama, juga terima kasih diucapkan semoga tuhan sahajalah dapat membalas jasa baik sekalian insan.

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The American College Test (ACT)

Analysis Varian (ANOVA)

Classical Test Theory (CTT)

Pemboleh Ubah Dummi Bagi Pelajar Cina (DCINA)

Differential Item Function (DIF)

Pemboleh Ubah Dummi Pelajar India (DINDIA)

Pemboleh Ubah Dummi Jantina (DLELAKI)

Pemboleh Ubah Dummi Pelajar Luar Bandar (DLUBAN)

Bahagian Perancangan dan Penyelidikan Dasar (EPRD)

Fakulti Perakaunan (FK)

Fakulti Komunikasi dan Bahasa Moden (FKBM)

Fakulti Pengurusan Perniagaan (FPP)

Halaman (hlm)

Human Science Research Council (HSRC)

Item Characteristic Curve (ICC)

Institut Perguruan Darulaman (IPDA)

Institut Pengajian Tinggi Awam (IPTA)

Item Respon Theory (IRT)

Item Analysis (ITEMAN)

Jabatan Pelajaran Negeri (JPN)

Kurikulum Bersepadu Sekolah Menengah (KBSM)

DAFTAR SINGKATAN PERKATAAN

Kurikulum Baru Sekolah Rendah (KBSR)

Kurikulum Bersepadu Sekolah Menengah (KBSM)

Kurikulum Lama Sekolah Menengah (KLSM)

Kaiser-Meyer-Olkin Measure (KMO)

Kementerian Pelajaran Malaysia (KPM)

Lembaga Peperiksaan Malaysia (LPM)

Multiple Choice Question (MCQ)

National Center for Educational Statistics (NCES)

National Educational Longitudinal Study (NELS)

Orientasi Pembelajaran Matematik (OPM)

Penilaian Menengah Rendah (PMR)

The Scholastic Aptitude Test (SAT)

Status Sosioekonomi (SES)

Study Orientation in Mathematics (SOM)

Sijil Pelajaran Malaysia (SPM)

Program Statistical Package for The Social Sciences (SPSS)

Third International Mathematics and Science Study (TIMSS)

Ujian Rujukan Norma (URN)

Universiti Sains Malaysia (USM)

Universiti Utara Malaysia (UUM)

Variation Inflation Factor (VIF)

BAB I

PENGENALAN

1.1 Pendahuluan

Kita selalu bertanyakan soalan "Mengapakah terdapat pencapaian yang berbeza di antara pelajar dalam sesuatu mata pelajaran?" Dalam matematik umpamanya ada pelajar yang menunjukkan pencapaian yang baik dan ada pula yang terus tercicir dalam menguasai mata pelajaran ini. Terdapat perbezaan antara cara pelajar mengamati dan mempelajari matematik kerana setiap individu mempelajari dan memproses maklumat matematik secara tersendiri. Beberapa sebab telah diutarakan tentang perbezaan pencapaian matematik dan antaranya ialah individu mempunyai orientasi pembelajaran matematik yang berlainan, unik dan tersendiri (Berita Matematik, 1993).

Orientasi pelajar dalam pembelajaran matematik boleh diukur dengan menggunakan lima faktor iaitu sikap, kebimbangan, tabiat, tingkah laku dalam penyelesaian masalah, dan persekitaran dalam pembelajaran matematik. Kelima-lima faktor ini penting dalam penambahbaikan orientasi pelajar dalam pembelajaran matematik (Maree, 1997). Mengetahui kekuatan dan kelemahan orientasi pembelajaran matematik dapat membantu dan membimbing pelajar ke arah yang lebih cemerlang dalam matematik. Orientasi pembelajaran matematik dapat mengenal pasti kecenderungan pelajar dalam menghadapi ujian matematik.

Dalam mempelajari matematik, pelajar berasa lebih selesa terhadap tajuk-tajuk yang mereka minati. Bagi item geometri, pelajar lelaki didapati

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Rujukan

Abdul Rahim M. Ali. (2001). *Ilmu Pendidikan Untuk KPLI.* Kuala Lumpur :Utusan Publication & Distributions Sdn. Bhd.

Abu Bakar Nordin. (1986). *Asas Penilaian Pendidikan.* Subang Jaya :Longman.

Ahmad Mahdzan Ayob. (2005). *Kaedah Penyelidikan Sosioekonomi* (ed. 3), Kuala Lumpur, DBP.

Aiken, L. R., Jr. (1970). Attitudes toward mathematics. *Review of Educational Research, 40*, 551-596.

Aiken, L. R., Jr. (1976). Update on attitudes and other affective variables in learning mathematics. *Review of Educational Research, 46*, 293 – 311.

Aleks, M. (2003). Analisis Penyelenggaraan Proses Belajar-Mengajar Matematik Pada Program Akselerasi SMP Negeri Padang. *Jurnal Pembelajaran, 26* (3).189-211.

Alwin, D., & Thorton, A. (1984). Family origins and schooling processes: Early versus late influence of parental characteristics. *American Sociological Review, 49*, 784-802.

Anarion, D. (2002). Implications and Applications of Modern Test Theory in The Context of Outcomes Based Education, *Studies in Educational Evaluation, 28*, 103-121.

Anneke, C.G., Adelene, A. G., & Karel, G. F. (2001). Some predictors of mathematics achievement among black secondary school learners. *South African Journal of Psychology, 31* (4), 48-54.

Arem, C.A., (1993). *Conquering Math Anxiety-A Self-Help: Workbook*, California: Brooks/Cole Publishing Company.

Armstrong, J. M. (1985).'A National assessment of Participation and Achievement of Women in Mathematics', in S. F. Chipman, L. R. Brush and D. M. Wilson (eds), *Women and Mathematics: Balancing the equation,* Erlbaum, Hillsdale, New Jersey, 59-94.

Aronson, E., Wilson, T., & Akert, R. M. (1999). *Social Psychology* (3rd ed.), New York.Longman.

Arsaythamby, V. (1999). *Bias Pencapaian Matematik Penilaian Menengah Rendah Terhadap Jantina, Bangsa dan Tiga Bidang utama Matematik KBSM.* Laporan Praktikum Pusat Pengajian Ilmu Pendidikan.USM.

Arsaythamby, V., & Rosna Awang Hashim. (2002). *Bias in Mathematics Achievement Test Item Towards Study Orientation base on IRT.* Kertas kerja yang dibentangkan dalam seminar Third International Symposium on Graduate Management Research. Universiti Utara Malaysia, Pusat Konvensyen, 22 – 23 September, 2002.

Arsaythamby, V., & Rosna Awang Hashim. (2004). *Kesahan, Kebolehpercayaan dan Bias Pembinaan Alat Ukur Orientasi Pembelajaran Matematik.* Kertas kerja yang dibentangkan dalam seminar The 4th ASEAN/Asian Symposium on Educational Management and Leadership, Universiti Utara Malaysia, Grand Plaza Parkroyal Hotel Pulau Pinang, 13 – 15 Disember, 2004.

Arsaythamby, V., & Rosna Awang Hashim. (2005). *Bias in Mathematics MCQ Test Amongst Students Characteristics in Secondary School Based on Classical Test Theory.* Kertas kerja yang dibentangkan dalam seminar Pacific Rim Objective Measurement Symposium (PROMS) & International Symposium on Measurement and Evaluation (ISME), Universiti Islam Antarabangsa Malaysia, Pan Pacific Hotel, Kuala Lumpur, 21-23 Jun, 2005.

Arsaythamby, V. (2006). *Kesahan, kebolehpercayaan dan bias ujian aneka pilihan matematik KBSM.* Geran Fakulti Sains Kognitif dan Pendidikan. Universiti Utara Malaysia.

Arsaythamby, V. & Rosna Awang Hashim. (2006). *Peranan ciri-ciri pelajar sebagai pemboleh ubah penyederhana hubungan antara sikap dan kebimbangan pembelajaran matematik dengan ujian aneka pilihan matematik.* Kertas kerja yang dibentangkan dalam Third International Conference on Measurement and Evaluation in Education (ICMEE), Universiti Sains Malaysia, Grand Plaza Parkroyal Hotel Pulau Pinang, 13-15 February, 2006.

Ary, D., Jacobs, L. C., & Razavieh, A. (2002). *Introduction to Research in Education.* (6th ed.),USA : Wadsworth Group.

Asiah Abu Samah. (1982). *Perkembangan Kurikulum Matematik Sekolah di Malaysia Sejak Zaman Penjajah,* Kertas kerja yang dibentangkan di Seminar Pendidikan Matematik, Universiti Kebangsaan Malaysia.

Azlan Ahmad Zanzali. (1995). Isu-isu berterusan dalam pendidikan matematik. *Jurnal Pendidik dan Pendidikan, 14*, Pusat Pengajian Ilmu Pendidikan, USM.

Barker, B. (1997). Girls' world of anxious times: What's really happening at school in The gender war? *Educational Review, 49*, 221 – 227.

Begle, E. G. (1979). *Critical Variables in Mathematics Education: Finding from a Survey of Empirical Literature.* MAA and NCTM.

Beller, M., & Gafni, N. (1996). The 1991 International Assessment of Educational Progress in Mathematics and Sciences: The gender differences perspective. *Journal of Educational Psychology, 88* (2), 365 – 377.

Benbow, C. P. (1988).Sex differences in Mathematical Reasoning Ability in Intellectualy Talented Prebadolescents: Their Nature, Effects and Possible Causes,*Behavioural and Brain Sciences, 11*, 169 – 232.

Berita Harian. (2002, Julai 18). *Jurang terlalu besar bagi pengambilan 2001/2002.* Rencana Berita Harian, pp.10.

Berita Matematik. (1993). *Sahsiah Pembelajaran Matematik, 42*, Pusat Perkembangan Kurikulum, Kementerian Pelajaran Malaysia.

Bhasah Abu Bakar. (2002), Penilaian Program Sarjana Muda Dengan Kepujian (Matematik) Universiti Pendidikan Sultan Idris: Persepsi Graduan Ambilan Jun 1996, *Proceedings of The Inaugural UPSI International Teacher Education Conference 2002.*

Bhasah Abu Bakar. (2003). *Asas Pengukuran Bilik Darjah.* Quantum Books. Tanjung Malim: Perak Darul Rizuan

Binet, A., & Simon, T. (1973). *The development of intelligence in children.* New York: Arno. (Original work published 1916).

Bishop, A. (1998). *Culture, Value, and Assessment in Mathematics. Proceeding of ICMI-EARCOME, 1*, 27-38.

Black, T. R. (2002). *Understanding Social Science Research* (2nd ed.). Londen, SAGE

Blankley, W. (1994). The abyss in African School Education in South Africa. *South African Journal of Science, 90,* 22-38.

Bolger, N., & Kellaghan, T. (1990). Method of Measurement and Gender Differences in Scholastic Achievement, *Journal of Educational Measurement, 27*(2), 165 – 174.

Bond, T. G., & Fox, C. M. (2001). *Applying the Rasch Model: Fundamental, Measurement in the Human Sciences.* London: Lawrence Erlbaum Associates.

Branca, N. A. (1980). Problems Solving as A Goal, Process and Basic Skill, in S. Krulik & R. E. Reys (eds), *Problem Solving School Mathematics 1980 Yearbook,* Restion, Va, NCTM.

Bronholt, L. J., Goodnow, J., & Conney , G.H. (1994). Influences of gender stereotypes on adolescents' perceptions of their own achievement. *American Educational Research Journal, 31*, 675 – 692.

Burns, M. (1998). *Math: Facing an American Phobia*. Sausalito, CA: Marilyn Burns Education Associates.

Burton, N. (1996). Have changes in SAT affected women's mathematics performance? *Educational Measurement: Issues and Practice , 15*(4), 5 – 9.

Calhoon, M. B., & Fuchs, L. S. (2003). The Effects of Peer-Assisted Learning Strategies and Curriculum-Based Measurement on the Mathematics Performance of secondary students with Disabilities, *Remedial and Special Education*, *24*(4), 235-245.

Callahan, L. G., & Clements, D. H. (1984). Sex differences in rote counting ability on entry to first grade: Some observations. *Journal for Research in Mathematics Education, 15*, 378-382.

Camilli, G., & Shepard, L. A. (1994). *Method for identifying biased test items*. Thousand Oaks, CA: Sage.

Campbell, N. K., & Hackett, G. (1986). The effects of mathematics task performance on math self-efficacy and task interest. *Journal of Vocational Behavior, 28*, 149-162.

Campbell, J. R., & Beaudry, J. S. (1998). Gender gap linked to differential socialization for high achieving senior mathematics students. *The Journal of Educational Research*, *91,* 140 – 147.

Campbell, J. R., Voelkl, K. E., & Donahue, P. L. (1999). Report in briefNAEP 1996 trends in academic progress. National Center for Education Statistics (Online Publication).Available http://nces.ed.gov/nations reportcard/96report/97986.shtml (1999, July 29).

Chieh Li & Nuttall, R. (2001). Writing Chinese and mathematics Achievement: A Study with Chinese-American Undergraduates. *Mathematics Education Research Journal. 13*(1),15-27.

Cleary, T.A. (1968). Test bias : Prediction of grades of Negro and White Students in Integrates Colleges. *Journal of Educations Measurement, 5*, 115 – 124.

Cleary, T. A., & Hilton, T. L. (1968). An investigation of item bias, E*ducational Measurement*, *31*, 67-78.

Cohen, R. J. (1988). *Statistical power analysis for the behavioral sciences*. Hillsdale, NJ: Lawrence Erlbaum.

Cohen, R. J. (1992). Statistical power analysis. *Current Directions in Psychological Science, 1* (3), 98-101.

Cohen, R. J. & Swerdlik, M. E. (2005). *Psychological testing And Assesssment:An Introduction to Test and Measurement (6th ed.).* New York, McGraw-Hill.

Coakes, S. J., & Steed, L. G. (2001). *SPSS analysis without anguish*, Brisbane, Australia, John Wiley & Sons.

Cooper, H., Valentine, J. C., Nye, B., & Lindsay, J. J. (1999). Relationships between five after-school activities and academic achievement. *Journal of Educational Psychology, 91*(2), 369-378.

Crocker, L., & Algina, J. (1986). *Introduction to Classical & Modern Test Theory*. New York: Holt, Rinehart & Winston.

Cronbach, L. J. (1970). *Essentials of Psychological Testing*. New York: Harper and Row Publishers.

Daniel, H. J. (2000). Students Self-Beliefs And Science Achievement in Ireland: Finding From Third International Mathematics and Science Study (TIMSS). *International Journal of Instructional Media, 27,* 1-32.

Darlington, R. B. (1971). Another look at culture fairness, *Journal of Educational Measurement, 8*, 71 – 82.

Doolittle, A. E., & Cleary, T. A. (1987). Gender – based differential item performance in mathematics achievement items. *Journal of Educational Measurement, 24,* 157 – 166.

Dorans, N. J. & Holland, P. W. (1993). *DIF detection and description : Mantel – Haenzel and standardization in differentiation item functioning.* Edited by P.W. Holland & Howard Wainer. Lawrence Erlbaum Associates.

Dorans, N. J. & Kulick, E. (1986) Demonstrating the utility of standardization approach to assessing unexpected differential item performance on the scholastic aptitude test : *Journal of Educational Measurement, 23,* 355 – 368.

Dossey, J. A., Mullis, I. V. S., Lindquist, M. M., & Chambers, D. L. (1988). *The mathematics report card: Are we measuring up? Trends and achievement based on the 1986 national assessment* (Report No. 17-M-01). Princeton, NJ: National Assessment of Educational Progress, Educational Testing Service. (ERIC Document Reproduction service No ED300206)

Dunn, R., & Dunn, K. (1999). *The complete guide to the learning styles inservice system*. USA: Allyn Bacon.

Du Toit, L. B. H. (1985). *Survey of Study Habits and Attitudes (SSHA)*. Pretoria: Human Sciences Research Council.

Ebel, R. L. (1965). *Measuring Educational Achievement.* Englewood Cliffs, New Jersey: Prentice-Hall.

Ebel, R. L. (1979). *Essentials of Psychological Measurement.* New Jersey: Prentice Hall.

Ebel, R. L., & Frisbie, D. A. (1986). *Essentials of Educational Measurement. Englewood Cliffs*, New Jersey: Prentice-Hall.

Eccles, J. S., & Jacobs, J. E. (1986). Social forces shape math attitudes and performance signs*: Journal of Women in Culture and Society, 11*, 367-380.

Eccles, J. S. (1994). Understanding women's educational and occupational choices. *Psychology of Women Quarterly, 18*, 585-609.

Edington, E. D., & Martellaro, H. C. (1989). Does school size have any relationship to academic achievement. *Rural Educator, 11*(2), 6-11.

Eells, K., Davis, A., Havighurst, R. J., Herrick, V. E., & Tyler, R. W. (1951). *Intelligence and cultural differences.* Chicago: University of Chicago Press.

Embretson, S. E., & Hershberger (1999). *The New Rules of Measurement: What Every Psychologist and Educator Should Know*, London: Lawrence Erlbaum Associates.

Engelhard, G. (1990). Gender differences in performance on mathematics items: Evidence from the United States and Thailand. *Contemporary Educational Psychology*, *15*, 13 – 26.

Erin, L., & Guang, G. (2001). Gender differences in Mathematical Trajectories. *Social Forces, 80*, 713-733.

Ethington, C. A., & Wolf, L. M. (1986). A structural model of mathematics achievement for men and women. *American Educational Research Journal, 23*, 65-75.

Fennema, E. H. (1974). Mathematics learning and the sexes: A review. *Journal for Research in Mathematics Education*, *5*, 126 – 139.

Fennema, E. H. (1980). *Sex – related differences in mathematics achievement : Where And why.* In L. H. Fox, L. Brody, & D. Tobin (Eds.), Women and the mathematical mystique (pp. 76 – 93). Baltimore: The Johns Hopkins University Press.

Fennema, E. H., & Hart, L. E. (1994). Gender and the JRME. *Journal for Research in Mathematics Education*, *25*, 648 – 659.

Fennema, E. H. (1996). Mathematics gender, and research. In G. Hanna (Ed.), Towards gender equity in mathematics education: An ICMI study (pp. 9-26). Dordrecht, The Netherlands: Kluwer.

Fey, J. T., & Hirsch, C. R. (1993). *Calculators in mathematics education*. Reston, VA: NCTM.

Fitzerald, S., Morrall, A., & Morrison, B. (2000). Catering for Individual Learning Styles: Experiences of Orienting Students in an Asian Self-Access Centre, http://elc,polyu.edu.hk/CILL/Staff/auto 2000. htm.

Friedman, L. (1989). Mathematics and the gender gap: A meta-analysis of recent studies on sex differences in mathematical tasks. *Review of Educational Research, 59*(2), 185-213.

Gall, M, D., Gall, J. P. & Borg, W. R. (2003). *Educational Research*: An Introduction (7th ed.).USA: Pearson Education, Inc.

Garden, R. A., & Orpwood, G. (1996). Development of the TIMSS achievement tests. In M. O. Martin & D. L. Kelly (Eds.), *Third International Mathematics and Science Study (TIMSS) technical report, Volume I:Design and development*. Boston College: Chestnut Hill, MA.

Gardner, R. C. (2001). *Psychological Statistics Using SPSS for Windows*, New Jersey: Prentice-Hall.

Gardner, D. & Miller, L. (1996). *Task for Independent Language Learning*. Virginia, USA: TESOL.

Geary , D. C. (1994). *Children's Mathematical Development: Research and Practical Applications*. Washington, DC: American Psychological Association.

Geary, D. C. (1996). Sexual selection and sex differences in mathematical abilities. *Behavioral and Brain Science, 19*, 229-284.

Green, P. J., Dugoni, B. L., Ingels, S. J., & Camburn, E. (1995). *A profile of the American high school senior in 1992. National Educational Longtidunal Study of 1988. Statistical Analysis Report*. National Opinion Research Center. (ERIC Document, Chicago, Reproduction Service No. ED386502).

Green, S. M., Salkind, N. J., & Akey, T. M. (1997). *Using SPSS for Window*: Analyzing and Understanding Data. New Jersey, Prentice-Hall, Inc.

Greenwald, R., Hedges, L. V., & Laine, R. D. (1996). The effect of school resources on achievement. *Review of Educational Research, 66*(3), 361-396.

Grey, C. (Ed.) (2001). *Why management learning? The Journal of Managerial and Organizational Learning.* SAGE Ltd. Online Journal daripada http://www.sagepub.com/shopping/journal.asp?id=4622

Gronlund, N. E. (1981). *Measurement and Evaluation in Teaching.* New York: MacMillan Publishing Co. Inc.

Griggs, S. A. (1991). *Learning styles conseling.* ERIC Digests. ED341890.

Hair, J. F. Jr, Anderson, R. E., Tatham, R. L., & Black, W. C. (1998). *Multivariate data analysis with readings* (5th ed.). New Jersey: Prentice Hall, Inc.

Haitham, M. A. (2001). Gender Differences in Mathematics Achievement Among High School Students in the United Arab Emirates, 1991-2000. *School Science & Mathematics, 101*(1), 5-10.

Haladyna, T. M., & Downing, S. M. (1989). A Taxonomy of Multiple-Choice Item-Writing Rules. *Applied Measurement in Education, 1*, 37-50.

Halpern, D. F., & LaMay, M. L. (2000). The smarter sex: A critical review of sex differences in intelligence. *Educational Psychology Review, 12*(2), 229-246.

Hambleton, R. K. & Swaminathan, H. (1985). Item *Response Theory: Principles and Applications*. Boston: Kluwer.

Hambleton, R. K, Swaminathan, & Rogers, H. J. (1991) *Fundamental of Item Response Theory.* London, New Delhi: Sage Publications.

Hambleton, R. K., Ronald, R., & Janne, A. R. (1995). *Item Bias Review* (ERIC/AE Digest.ED 398241).

Hand, J. D. (1982). "Brain function during learning, implication for text design". *The Technology of Tex (*ed.). David H. Jonassen. Englewood Cliffs, New Jersey: Educational Technology Publications Inc.

Hanna, G. (1986), "Sex Differences in Mathematics Achievement of Eight Graders in Ontario. *Journal for Research in Mathematic Educations, 17,* 46-57.

Hart, L. E. (1989). *Describing the affective domain: Saying what we mean.* In D. B. McLeod & V. M. Adams (Eds.), Affect and mathematical problem solving: A new perspective (pp. 37-45). New York: Springer-Verlag.

Harvey, J. G. (1992). Mathematics testing with calculators: Ransoming the hostages. In T. A. Romberg (ed.), *Mathematics Assessment and Evaluation Cultural Variations in Family Belieftion*, 139-168. Albany: State University of New York Press.

Hashim Yaacob. (2004). *Malaysia Sciences and Mathematics Education: Reflection and Reinvention.* Kertas kerja yang dibentangkan dalam National Conference on Science and Mathematics Education: Innovations for Excellence,UM, di Hotel Renaissance Kota Bharu, 9-11 Oktober 2004.

Hawn, H. C., Elliot, C. D., & Des Jardinos, L. (1981). *Differences in mathematics achievement between males and females in grades 1-3.* Paper presented at the annual meeting of the Eastern Educational Research Association, Philadelphia. (ERIC Document Reproduction Service No. ED209094).

Head, J. (1981). Personality and the Learning of Mathematics, *Educational Studies in Mathematics, 12*, 339-350.

Hedges, L. V., & Nowell, A. (1995). Sex differences in mental test scores, variability and numbers of high scoring individuals. *Science, 269*, 41-45.

Hembree, R. (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education, 21,* 33 – 46.

Hess, R. D., Cheng, C. M., & McDevitt, T. M. (1987). Cultural variations in family beliefs about children's performance in mathematics: Comparisons among People's Republic of China, Chinese-American, and Caucasian-American Families. *Journal of Education Psychology, 79*, 179-188.

Holland, P. W., & Thayer, D. T. (1988) *Differentianal Item Performance and the Mantel Haenzel Procedure* . In H. Wainer & H.Brauns (Edited). Test validity (pp.129–145) Hillsdale. New Jersey: Lawrence Erlbaum Associates.

House, J. D. (1995). Noncognitive predictors of achievement in introductory college chemistry, *Research in Higher Education, 36*, 473-490.

Howell, D. C. (1997). *Statistical methods for psychology*. Belmont, CA: Duxbury.

Humphreys, L. G. (1952). Individual Differences. *Annual Review of Psychology, 3*, 131-150.

Hunt, G. E. (1985). Math Anxiety – where do we go from here? *Focus on Learning Problems in Mathematics,7*(2), 29-40.

Hunter, J. E., & Schmidth, F. L. (1976). A critical analysis of the statistical and ethical implications of various defination of "test bias", *Psychological Bulletin, 83*, 1,053 – 1,071.

Hunter, J. E., Schmidth, F. L., & Hunter, R. (1979). Differential validity of employment tests by race: A comprehensive review and analysis. *Psychological Bulletin, 86*, 721-735.

Hunter, J. E., Schmidth, F. L., & Rauschenberger, J. (1984). Methodological, statistical, and ethical issues in the study of bias in psychological tests. In C. R. Reynolds & R. T. Brown (Eds.), *Perspectives on bias in mental testing* (pp. 41-99). New York: Plenum.

Hui, C. H., & Triandis, H. C. (1989). Effects of culture and response format on extreme response style. *Journal of Cross-Cultural Psychology, 20*, 296-309.

Hyde, J. S., Fennema, E., & Lamon, S. J. (1990). Gender differences in mathematics performance: A meta – analysis. *Psychological Bulletin, 107*, 139 – 155.

Hyde, J. S., Fennema, E., Ryan, M., Frost, L. A., & Hopp, C. (1990). Gender comparisons of mathematics attitudes and affect: A meta-analysis. *Psychology of Woman Quarterly, 14*, 299-324.

Ibrahim Ahmad Bajunid. (2002, November 10). *Nurture the love for maths.* News Straits Times Learning Curve, pp. 20.

Ironson, G. H. (1982). Use of chi-square and latent trait approaches for detecting item bias. In R. A. Berk (ed.), *Handbook of methods for detecting item bias* (pp. 117-155). Baltimore: Johns Hopkins University Press.

Jabatan Pelajarn Negeri Kedah. (2001). *Perangkaan Pendidikan Sekolah*. JPNK.

Jensen, A. R. 1980. " *Sex bias.*" Chap. 13, pp. 621 – 34 in Bias in Mental Testing. Free Press.

Jerry, T., Chester, R. R., Maximino, P., & Ng. Kok- Mun (2000). Effects of Gender, Socioeconomic Status, and early Academic Performance on Post Secondary Educational Choice, *Journal of Counseling & Development, 28* (4), 463-472.

Jeynes, W. H. (2002). Why Religious Schools Positively Impact The Academic Achievement of Children, *International Journal of Education and Religion, 3* (1), 16-32.

Johnson, R. A., & Wichern, D. W. (1992). *Applied Multivariate Statistical Analysis* (3rd ed.). New Jersey: Prentice-Hall, Inc.

Kanjee, M., Kanjee, M. A., & Clauser, B. E.(1995). Using logistic regression and the Mantel – Haenzel with multiple ability estimates to detect differential item functioning. *Journal of Educational Measurement, 32* (2). NCME.

Kaplan, R. M., & Saccuzzo, D. P. (2001). *Psychological Testing-Principles, Applications, and Issues.(5th ed.)*. Belmont, CA: Wadsworth.

Kaiser, H. F. (1974). Little jiffy, Mark iv. *Educational and Psychology Measurement, 34*, 11-117.

Ryan, E. K. (2001). An Examination of Item Context Effects, DIF, and Gender DIF. *Applied Measurement in Education, 14* (1) ,73-90.

Kennedy, W. A., Van De Riet, V., & White, J. C. (1963). A normative sample of intteligence and achievement of Negro elementary school children in the Southeastern United States, *Child Development Monographs, 28*(6) (Serial no.90)

Kennedy, L. M., & Tipps, S. (1991). *Guiding children's learning of mathematics* (6th ed.), Belmont, CA: Wadsworth.

Kimball, M. M. (1989). A new perspective on women's math achievement. *Psychological Bulletin, 105* (2), 198 – 214.

Knodel, J. (1997). The closing of the gender gap in schooling : The case of Thailand. *Comparative Education, 33* (1), 61 – 86.

Kubiszyn, T., & Borich, G. (2003). *Educational Testing and Measurement*: Classroom Application and Practice, (7th ed.). USA: John Wiley & Sons.INC.

Laporan Prestasi SPM. (2002). Lembaga Peperiksaan Malaysia, Kementerian Pendidikan Malaysia.

Lashley, C. & Best, W. (2001). *12 Steps to Study Success*. London: Continuum.

Lazarus, A. (1974). Mathophobia: Some personal speculations. *National Elementary Principle, 53* (2), 16-22.

Leder, G. C. (1987). *Attitudes towards mathematics*. In T. A. Romberg & D. M. Stewart (Eds.), The monitoring of school mathematics (pp. 261-277). Madison:Wisconsin Center for Educational Research.

Leder, G. C. (1990), 'Gender differences in mathematics and overview',in Fennema, E. & Leder, G. (eds.), *Mathematics and Gender : Influences on Teachers and Students,* Teachers' College Press, New York, 10 – 26.

Leder, G. C. (1992). Mathematics and gender: Changing perspectives. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 597-622). New York: Macmillan.

Lee, J. (1998). State Policy Correlations of the Achievement Gap Among Racial and Social Groups, *Studies in Educations, 24*, 137 – 152.

Lee, V. E., & Smith, J. B. (1997). High school size: Which works best and for whom? *Educational Evaluation and Policy Analysis, 19*(3), 205-227.

Lee, V. E., & Bryk, A. S. (1989). A Multilevel model of the distribution high school achievement. *Sociology of Education, 62*(3), 172-192.

Lee, V. E., Smith, J. B., & Croninger, R. G. (1997). How high school organization influences the equitable distribution of learning in mathematics and science. *Sociology of Education, 70*, 128-150.

Leung, F. K. S. (2002). Behind the high Achievement of East Asian Students. *Educational Research and Evaluation, 8* (1), 87-108.

Liebert, R. M., & Morris, L. W. (1967). Cognitive and emotional compenents of test anxiety: A distinction and some initial data. *Psychological Reports, 20*, 975-978.

Linn, R. L. (1973). Fair test use in selection. *Review of Educational Research, 43*, 343-357.

Linn, R. L., & Drasgow, F. (1987). Implications of the Golden Rule Settlement for Test Construction. *Educational Measurement: Issues and Practice, 6*(2), 13-17.

Littlejohn, S. W. (1995). *Theories of Human Communication* (3rd ed.) Belmont, CA: Wadsworth.

Lord, F. M. & Novick, M. W. (1968). *Statistical Theories of Mental Test Scores*. Reading, MA: Addison-Wesley.

Lummis, M., & Stevenson, H. W. (1990). " Gender Differences in Beliefs and Achievements: A cross – Cultural Study." *Development Psychology, 26*, 254 – 263.

Ma, X. (1995). Gender differences in mathematics achievement between Canadian and Asian education systems. *The Journal of Educational Research, 89*, 118 – 127.

Ma, X. (1997). Reciprocal relationships between attitude towards mathematics and achievement in mathematics. *The Journal of Educational Research, 90*, 221-229.

Mandler, G., & Sarason, S. B. (1952). A study of anxiety and learning. *Journal of Abnormal and Social Psychology, 47*, 166-173.

Maree, J. G. (1996). *Study Orientation: Maths Questionnaire SOM*, Human Sciences Research Council. Pretoria University, South Africa.

Maree, J. G. (1997). *The Study Orientation Questionnaire in Mathematics (SOM).* Pretoria: Human Sciences Research Council. Pretoria University, South Africa.

Maree, J. G., & Claassen, N. C. W., (1998). Development of a Study Orientation Questionnaire in Mathematics, *South African Journal of Psychology*, *28*(2), 101-110.

Gamer, M.., & Engelhard, G. E. Jr. (1999). Gender Differences in Performance on Multiple-Choice and Constructed Response Mathematics Items. *Applied Measurement in Education*, *12* (1), 29-52.

Martinez, J., & Martinez, N. (1996). *Math without fear*, Needham Heights, MA: Allyn & Bacon.

Masilela, P. J. (1988). A Socio-pedagogic description of factors that influence scholastic achievement of secondary school learning in KwaNdebela. Unpublished M.Ed. mini-thesis, University of Zululand, Durban.

Mason, L. (2003). High School Students' Beliefs About Maths, Mathematical Problem Solving, and Their Achievement in Maths: A Cross-Sectional Study. *Educational Psychology, 23* (1), 73-85.

Maqsud, M., & Kalique, C. M. (1991). Relationship of some socio-personal factors to mathematics achievement of secondary school and university students in Bophuthatswana. *Educational Studies in Mathematics*, *22*, 377 -390.

Maqsud, M. (1993). Academic Self-Concept:its relations to sex, age, socioeconomic status and scholastic achievement. *Acta Academica, 25* (1), 101-117.

Magdalena M. C.M., & Yin C. C. (2001). A theory of self-learning in a networked human and IT environment: implications for education reforms, *The International Journal of Educational Management, 15* (4), 172-186.

Mazzeo, J., Scmitt, A., & Bleistein, C. (1990). Exploratory analysis of some possible chances for the discrepancies in gender differences on multiple choice and free response sections of the Advanced Placement Examinations (Draft Report). *Educational Testing Service.* New Jersey: Princetion.

McConeghy, J. I. (1987). *Mathematics attitudes and achievement: Gender differences in a multivariate context.* (ERIC Reproduction Service No. ED284742).

McCoy, L. P. (2005). Effect of Demographic and Personal Variables on Acievement in Eightt-Grade Algebra. *The Journal of Educational Research, 98*(3), 131-135.

McLeod, D. B. (1992). *Research on affect in mathematics education: A reconceptualization.* In D. A. Grouws (Ed.), Handbook of research on mathematics teaching and learning (pp. 575-596). New York: Macmillan.

McLeod, D. B. (1994). Research on affect in mathematics learning in the JRME: 1970 to the present. *Journal for Research in Mathematics Education, 25*, 637-647.

McNemar, Q. (1975), On so call test bias. *American Psychologist, 30*, 848 – 857.

Menard, S. (1995). *Applied Logistic Regression Analysis*, Sage Publication, London.

Michaels, L., & Forsyth, R. (1978). Measuring attitudes towards mathematics: Some questions to consider. *Arithmetic Teacher, 26,* 22-25.

Miles, J., & Shevlin, M. (2001). *Applying regression & correlation: A guide for students and researchers*. London: Sage Publications.

Millsap, R. E. (1997). Invariance in measurement and prediction: Their relationship in the single-factor case. *Psychological Methods*, *2*, 248-260.

Mittelberg, D., & Lev – Ari, L. (1999). Confidence in mathematics and its consequences: Gender differences among Israeli Jewish and Youth. *Gender and Education*, *11* (1), 75 – 92.

Moktar Ismail. (1995). *Penilaian di bilik darjah*. Kuala Lumpur: DBP.

Moss, J. D. & Brown , F. G. (1979). Sex bias and academic performance : An empirical study. *Journal of Educational Measurements, 16.* 197 – 201 .

Mueller, D. J. (1986). *Measuring Social Attitudes*, Colombia University, New York, Teachers College.

Murphy, K. R., & Davidshofer, C. O. (1991). *Psychological Testing: Principles and Applications.* Englewood Cliffs, New Jersey: Prentice Hall.

National Center for Education Statistics. (Oroducer and Distributior) (1998). National Education Longitudinal Study: 1988-94: Data files and electronic codebook system (CD-Rom dala files and documentation). Washington, DC: Author.

National Council of Teachers of Mathematics. (1998). *Curriculum and Evaluation Standards for School Mathematics*. Reston, VA: Author.

National Council of Teachers of Mathematics. (2000). *Curriculum and Evaluation Standards for School Mathematics.* Reston, VA: Author.

Nitko, A. J. (1983). *Educational Tests and Measurement an Introduction,* New York: Harcourt Brace Jovanovich, Inc.

Noor Azlan Ahmad Zanali. (1995). Isu-isu berterusan dalam pendidikan matematik. *Jurnal Pendidikan dan Pendidik, 14*, PPIP.USM.

Noor Shah Saad. (2001). *Teori dan Perkaedahan Pendidikan Matematik.* Petaling Jaya: Prentice Hall.

Nowell, A., & Hedges, L. V. (1998). Trends in gender differences in academic achievement from 1960-1994: An analysis of differences in mean, variance, and extreme scores. *Sex Roles*, *39*, 21-43.

Norusis, M. J. (1997). *SPSS 7.5 Guide to Data Analysis*. New Jersey: Prentice-Hall.

Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.), USA: McGraw-Hill.

Nunnally, J. C. & Bernstein, I. H. (1994). *Psychometric Theory (* 3rd ed.), USA: McGraw-Hill.

Omar Mohd Hashim. (2003). *Pentaksiran Pendidikan Alaf Baru,* Kertas Kerja Seminar Pentaksiran Pendidikan Kebangsaan, 5-8 Mei 2003, The Legend Hotel, Kuala Lumpur.

O'Neil, H. F., Jr., & Abedi, J. (1996). Reliability and validity of a state metacognitive inventory: Potential for alternative assessment. *Journal of Educational Research*, *89*, 234-245.

Oxford, R. (1988). *The Role of styles and strategies in Second Language Learning.* ERIC Digests. ED317087

Peng, S. T., & Hill, S. T. (1995). *Understanding racial-ethnic differences in Secondary school Science and mathematics achievement.* Washington, DC: National Center for Education Statistics. Report No. 95.

Piaget, J. (1965). *The Child's Conception of Number.* New York: Humanities Press.

Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1989). *A Manual for the Use of the Motivated Strategies for Learning Questionnaire (MSLQ).* Ann Arbor, MI: NCRIPTAL, The Univercity of Michigan.

Polya, G. (1957). *How to Solve It: A New Aspect of Mathematical Method* (2nd ed.), New Jersey: Princeton University Press.

Polya, G. (1973). How *to Solve It: A New Aspect of Mathematical Method*, New Jersey, Princeton University.

Poortinga, Y. H. (1989). Equivalence of cross-cultural data: An overview of basic issues. *International Journal of Psychology*, *24*, 734-756.

Popham, W. J. (1975). *Educational Evaluation*. New Jersey: Prentice-Hall.

Pusat Perkembangan Kurikulum. (1987), *Kurikulum Bersepadu Sekolah Menengah Matematik*, Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Pusat Perkembangan Kurikulum. (2000), *Kurikulum Bersepadu Sekolah Menengah Matematik (KBSM)*, Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Pusat Perkembangan Kurikulum. (2001a). *Penilaian Kendalian Sekolah*, Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Pusat Perkembangan Kurikulum. (2001b). *Pembelajaran Akses Kendiri*, Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Pusat Perkembangan Kurikulum. (2001c). *Pembelajaran Masteri*, Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Randhawa, B. S. (1994). Self – efficacy in mathematics, attitudes and achievement of boys and girls from restricted samples in 2 countries. *Perceptual and Motor Skills, 79*, 1011 – 1018.

Report / Newsmagazine. (Alberta Edition),(4/29/2002). *Stupid Math Tricks, 29* (9), 5-9.

Reyes, L. H. (1980). *Attitudes and Mathematics*. In M. M. Lindquist (Ed.), Selected issues in mathematics education (pp. 161-184). Berkeley, CA:McCutchan.

Reyes, L. H. (1984). Affective variables and mathematics education. *The Elementary School Journal, 84*, 558-581.

Reys, R. E., Lindquist, M. M., Lambdin, D. V., Smith, N. L., & Suydam, M. N. (2004). *Helping Children Learn Mathematics: Active Learning Edition With Integrated Field Activities*. USA: John Wiley & Sons.

Richardson, F. C., & Suinn, R. M. (1972). The Mathematics Anxiety Rating Scale: Psychometric Data. *Journal of Counseling Psychology, 19*, 551-554.

Robert, H., Lisbeth, A., & Gerald, T. (2001). Influence of Elementery Student Gender on Teachers' Perceptions of Mathematics Achievement, *Journal of Educational Research*, *95* (2), 93-92.

Rohana Yusuf. (2004). Penyelidikan Sains Sosial. (Edisi Kemas Kini): Pahang: PTS Publication & Distributors.

Roznowski, M., & Reith, J. (1999). Examining the measurement quality of tests containing differentially functioning items: Do biased items result in poor measurement? *Educational and Psychological Measurement, 59*, 248-269.

Sacket, P. R., & Wilk, S. L. (1994). Within-group norming and other forms of score adjustment in preemployment testing. *American Asychologist, 49*, 929-954.

Saljo, R. (1982). *Learning and Understanding.* A Study of Differences in Constructing Means From a Text. (Goteborg Studies in Educational Science 41). Goteborg: Acta Universitatis Gothoburgensis.

Schiller, K. S., Khmelkov, V. T., & Xiao-Qing Wang (2002). Economic Development and the Effects of Family Characteristics on Mathematics Achievement. *Journal of Marriage and Family, 64*, 730-742.

Schafer, J., & Cherpitel, C. J. (1998). Differential item functioning of the CAGE, TWEAK, BMAST and AUDIT by gender and ethnicity. *Contemporary Drug Problems, 25,* 339-409.

Scheuneman, J.D., & Gerritz, K. (1990). Using differential item functioning procedures to explore sources of item difficulty and group performance characteristics. *Journal of Educational Measurement, 27*, 109-131.

Scheuneman, J.A., & Grima, A. (1997). Characteristics of quantitative word items associated with differerential performance for female and black examinees. *Applied Measurement in Education, 10*, 299 – 320.

Scheuneman, J. (1975). *A new method of assessing bias in test items.* Paper presented at the meeting of the American Educational Research Association, Washington.

Schmidt, F. L., Pearlman, K., & Hunter, J. E. (1980). The validity and fairness of employment and educational tests for Hispanic Americans: A review and analysis. *Personal Psychology, 33*, 705-724.

Schminke, C. W., Maertens, N., & Arnold, W. (1978). *Teaching the child mathematics.* New York: Holt, Rinehart & Winston.

Schommer, M. (1993). The effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology, 82*, 498-504.

Schommer, M., Calvert, C., Garglietti, G., & Bajaj, A. (1997). The development of epistemological beliefs among secondary students: A longtidunal study. *Journal of Educational Psychology, 89*, 37-40.

Schreiber, J. B. (2002). Institutional and Student Factors and Their Influence on advanced Mathematics Achievement. *The Journal of Educational Research, 95*(5), 274-286.

Secada, W. G. (1992). Race, ethnicity, social class, language and achievement in mathematics. In D. A. Grouws (Ed.), *Handbook of research on mathematics teaching and learning* (pp. 575 – 596). New York: Macmillan.

Sehee Hong & Roznowski, M. (2001). An Investigation of the Influence of Internal Test Bias on Regression Slope. *Applied Measurement in Education, 14*(4), 351-368.

Sekaran, U. (2000). *Research Methods for business*: *A skill building approach* (3rd ed.), New York: John Wiley & Sons.

Sekaran, U. (2003). *Research Methods for business*: *A skill building approach* (4th ed.), New York: John Wiley & Sons.

Shealy, R., & Stout, W. (1993). A Model-based standardization approach that separates true bias/DIF from group ability differences and detects test bias/DIF as well as item bias/DIF. *Psychometrika, 58*, 159-194.

Sheffield, L. J. (2005). *Teaching And Learning Mathematics: Pre-Kindergarten Through Middle School.* USA: John Wliley & Sons.

Shepard, L. A. (1982). Definitions of bias. In R. A. Berk (Ed.). *Handbook of methods for detecting test bias* (pp. 9-30). Baltimore: Johns Hopkins University Press.

Skemp, R. R. (1971). The Psychology of Learning Mathematics, Middlesex: Penguin Books Limited.

Spearman, C., (1904). General intelligence, objectively determined and measured, *American Journal of Psychology, 15*, 201-293.

_____(1907). The method of right and wrong cases "constant stimuli" without Gauss's formulae, *British Journal of Psychology, 2,* 227-242.

_____(1913). *The Nature of Intelligence and the Principles of Cognition*, London: Macmillan.

SPSS. (1999). *SPSS base 9.0: Applications Guide.* IL: SPSS.

Stanley, J. C. (1993). *Boys and girls who reason well mathematically.* In G. R. Bock & K. Ackrill (Eds.), The origins and development of high ability (pp. 119-138). New York: Wiley.

Stern, W. (1914). *The psychologyical methods of testing intelligence.* Baltimore: Warwick & York.

Stevenson, H.W. (1987). America's math problems. *Educational Leadership, 45*, 4-10.,

Stevenson, H.W., Lee, S.Y., & Stigler, J.W. (1986). Mathematics achievement of Chinese. Japanese and American children, *Science, 231*, 693-699.

Steyn, T., & Maree, J. G. (2002). A Profile of First-Year Students' Learning Preferences and Study Orientation in Mathematics, *South African Journal of Education. 22* (4).

Stout, W., & Roussos, L. (1995). SIBTEST user manual. Urbana : University of Illinois.

Stout, W., Li, H., Nandakumar, R., & Bolt, D. (1997). MULTISIB: A procedure to investigate DIF when a test is intenstionally two-dimensional. *Applied Psychological Measurement, 21*, 195-213.

Stumpf, H., & Stanley, J. C. (1996). Gender – related differences on the College Board Advanced Placement and Achievement Tests, 1982–1992. *Journal of Educational Psychology, 88,* 353-364.

Sukatan Pelajaran Matematik KBSM. (1998). Pusat Perkembangan Kurikulum, Kementerian Pendidikan Malaysia.

Tabachnick, B. G., & Fidell, L. S. (1989). *Using Multivariate Statistics* (2nd ed.). New York: Harper & Row.

Tan, T. K. (1997). *Satu Kajian Terhadap Penguasaan Kemahiran Asas Operasi Matematik KBSR di kalangan pelajar Tingkatan 1 dengan berasaskan kepada Ujian Rujukan Kriteria,* Laporan Praktikum Pusat Pengajian Ilmu Pendidikan, USM.

Taole, J. K. (1991). A comparison of Performance in Mathematics Between Boys and Girls on the 1990 Junior Certificate Examination in Botswana', *Boleswa Educational Research Journal, 8,* 29-39.

Taole, J. K., Zonneveld, M., & Letsie, T. L. (1995). Gender Interaction in Mathematics Classrooms: Reflection and Transformation, *Educational Studies in Mathematics, 28*, 263-274.

Tanner, D. E. (2001). *Assessing Academic Achievement*, Boston: Allyn & Bacon.

Thorndike, R. L. (1971), Concepts of culture fairness. *Journal of Educational Measurement, 8*, 63 – 70.

Thorndike, R. L.(2001), *Measurement and Evaluation in Psychology and Education* (6th ed.) Merill, Upper Saddle River, New Jersey: Colombus.

Tobias, S. (1985). Test Anxiety: Inference, defective skills, and cognitive capacity. *Educational Psychologist, 20*, 135-142.

Taylor, S. E., Peplau, L. A., & Sears, D. O. (1997). *Social Psychology*, New Jersey: Prentice Hall.

Tocci, C. M., & Engelhard, G. Jr. (1991). Achievement, parental support, and gender differences in attitudes towards mathematics. *Journal of Educational Research, 84*, 280 – 286.

Tuckman, B. W. (1999). *Conducting Educational Research*. Florida: Harcourt Brace & Co.

Valanides, N. (1998). Formal Operational Performance and Achievement of Lower Secondary School Students, *Journal of Studies in Educations Evaluation, 24*, 1-23

van de Vijver, F., & Leung, K. (1997). *Methods and Data Analysis for Cross-Cultural Research.* Cross-Cultural Psychology. SAGE Publications.

van de Vijver, F. J. R., & Poortinga, Y.H. (1997). Towards an integrated analysis of bias in cross-cultural assessment. *European Journal of Psychological Assessment, 13*, 21-29.

Visser, D (1988). Mathematics- the critical occupational filter for women. *South African Journal of Science, 85*, 212-214.

Walsh, W. B., & Betz, N. E. (1995). *Tests and Assessment* (3rd ed.). New Jersey: Prentice-Hall, Inc.

Wan Zah Wan Ali. (2000). *Memahami Pembelajaran*, Kuala Lumpur: Utusan Publication.

Weinstein, C. E. (1987). LASSI: *Learning and Study Startegies Inventory. User's manual.* Clear Water, South Africa: H & H Publication.

Wigfield, A., & Meece, J. L. (1988).Math anxiety in elementary and secondary school. *Journal of Educational Psychology, 80*, 210-216.

Wine, J. (1971). Test anxiety and direction of attention. *Psychological Bulletin, 76*, 92-104.

Wood, E. F. (1999). Math anxiety and elementary teachers: What does research tell us? *For the learning of mathematics, 8* (1), 8-13.

Zalizan Mohd Jelas. (2002, Julai 18). *Kajian pakar pendidikan kesan empat faktor utama.* Rencana Berita Harian, pp. 11.